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SECTIONS IN YOUR REPORT

- Introduction
- Implementation details
- Theoretical analysis
- Experimental setup
- Results and Discussion
- Conclusion
EXAMPLE PROBLEM

- Sum of numbers stored in a vector
INTRODUCTION

- Problem statement
- Summary of what you learnt through this assignment
- Summary of results you found
  - Comment on any comparison result and your inference (i.e., which is the best in which scenario).
INTRODUCTION

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- Summary of what you learnt through this assignment
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- “In this assignment, we study the addition of numbers stored in a vector”…
- “While doing the assignment, I learnt how to use iterators”…
- “The experiments show that adding numbers stored in vector takes O(n) time, where n is the number of elements in the vector.”…
IMPLEMENTATION DETAILS

- Details about the containers and functions you implemented
  - Containers: What's the underlying data structure for the container
  - Functions: Major functions especially ones directly used in experiments or related to them.
- Your thoughts and progress
IMPLEMENTATION DETAILS

- Details about the containers and functions you implemented
  - Containers: What’s the underlying data structure for the container
  - Functions: Major functions especially ones directly used in experiments or related to them.
- Your thoughts and progress

- “I first constructed a vector to store all the numbers. Then I implemented the sum of all the numbers stored in the vector. The function takes vector as input and returns the sum as result. ….”
THEORETICAL ANALYSIS

- Discuss about the time complexity of the functions you are about to analyze in the experiments.
  - Comment on the justification for the complexity
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Comment on the justification for the complexity

“ In theory, adding elements stored in the vector requires traversing through the vector making it an O(n) operation”.
EXPERIMENTAL SETUP

- Machine specification: OS, RAM, etc. (only if you are using a machine other than linux.cse.tamu.edu)
- Input sizes you conducted your experiments
- Any parameters you set
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- Input sizes you conducted your experiments
- Any parameters you set (eg., increment size in incremental strategy)

- “linux.cse.tamu.edu” …
- “Input sizes used in the experiments: $2^1, 2^2, ..., 2^{23}$”
RESULTS AND DISCUSSION

- Plot the experimental data (i.e., mostly time)
  - For comparison plot, you can use a single plot with different line legends
- Discuss what you infer from the plot
  - General trends shown in the plots
  - Any anomalies you observe and try to find a reason for it.
  - Big Oh constants from Big Oh plots
RESULTS AND DISCUSSION

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- “In the above plot, we plot the total time (y-axis) taken to calculate the sum of elements in a vector of varied sizes (x-axis). As shown in the plot, the calculation of sum of elements stored in vector shows a linear trend i.e., $O(n)$…”
For functions like `push_back`, we compute the total time for n push operations.

While plotting, we plot the average time instead of total time with respect to varying size:

- Average time, i.e., \( \frac{\text{Total Time}}{\text{Total Size}} \) vs. Total Size
BIG OH CONSTANTS

- Actual or experimental time $f(n)$
- Big oh complexity: $O(g(n))$, $c \cdot g(n) > f(n)$ for $n > n_0$
- Big Oh constants to find: $c, n_0$
  - Plot (Average Time/Theoretical Time) ($y$-axis) vs. Size ($x$-axis)
  - $c$ = where in $y$-axis levels and becomes $\parallel$ to $x$-axis
  - $n_0$ = where in $x$-axis, the line becomes $\parallel$ to $x$-axis
CONCLUSION

- Summary of results you found
- Summary of inference you drawn
- Your thought (if any) about what you learnt and others.